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LISTING OF THE CLAIMS

Claims 8, 35, and 38-41 are canceled here and none of the claims have been amended. For the convenience of the Applicants and the Examiner, a complete listing of the claims in their current form is provided below.

1. (Previously Presented) A method of accelerating a dose of particles in a needleless injection device according to claim 20 having a driver chamber and a duct section downstream of said driver chamber, the method comprising:

opening said closure means located between said driver chamber and said duct section;

producing a primary shock wave traveling in a downstream direction in said duct section;

establishing a substantially quasi-steady flow of fluid in said duct section upstream of said primary shock wave; and

entraining and accelerating substantially all the dose of particles in said substantially quasi-steady flow for the duration of time that said particles are in said duct section.

2. (Original) A method of accelerating a dose of particles in a needleless injection device according to claim 1, wherein the duct section is of substantially constant cross-sectional area and the method further comprises initiating a starting process when said primary shock wave reaches the downstream end of said substantially constant cross-sectional area duct section.

3. (Original) A method of accelerating particles according to claim 2, wherein said step of entraining and accelerating said particles is carried out in said duct section of substantially constant cross-sectional area.

4. (Previously Presented) A method of accelerating a dose of particles in a needleless injection device according to claim 1, further comprising producing a secondary shock wave traveling in a downstream direction behind said primary shock wave.

5. (Original) A method of accelerating particles according to claim 4, wherein said quasi-steady flow is established upstream of said secondary shock wave.

6. (Previously Presented) A method of accelerating particles according to claim 1, wherein said particles are entrained and accelerated from an initial position upstream of said closure means.

7. (Previously Presented) A method of accelerating particles according to claim 1, wherein said particles are not accelerated through a constriction downstream of said closure means.

8. (Canceled)

9. (Previously Presented) A method of accelerating particles according to claim 1, further comprising directing said quasi-steady flow of fluid through a divergent nozzle positioned downstream of said duct section.

10. (Original) A method of accelerating particles according to claim 9, wherein said quasi-steady flow directed through said divergent nozzle portion is substantially correctly expanded.

11. (Previously Presented) A method of accelerating particles according to claim 9, wherein said quasi-steady flow directed through said nozzle portion exits the downstream end of said device with a velocity distribution that is substantially uniform over a cross-section thereof.

12. (Previously Presented) A method of accelerating particles according to claim 9, wherein said divergent nozzle portion has an internal contour such that substantially no oblique shocks are formed in the part of said quasi-steady flow in which said particles are entrained.

13. (Previously Presented) A method of accelerating particles according to claim 9, further comprising spacing said needleless injection device from a target plane;

creating a substantially normal shock wave at the exit of said divergent portion;

decelerating the particles in said substantially normal shock wave so as to have a generally radially uniform velocity as they impact the plane.

14. (Previously Presented) A method of accelerating particles according to claim 9, further comprising the step of initiating a (u-a) wave at the downstream end of said duct section.

15. (Original) A method of accelerating particles according to claim 14, wherein said quasi-steady flow is established upstream of said (u-a) wave.

16. (Previously Presented) A method of accelerating particles according to claim 1, further comprising creating an expansion wave which travels in an upstream direction from the location of said closure means.

17. (Original) A method of accelerating particles according to claim 16, further comprising reflecting said expansion wave so that it travels in a downstream direction.

18. (Original) A method of accelerating particles according to claim 17, wherein said quasi-steady flow is terminated when said reflected expansion wave passes out of the downstream end of the device.

19. (Previously Presented) A method of accelerating particles according to claim 1, further comprising the step of selecting the driver gas species, or combination of species, so as to control the velocity of the particles as they exit the device.

20. (Previously Presented) A needleless injection device comprising:

a driver chamber arranged, in use, to contain a charge of pressurized gas;

a duct section connected to said driver chamber to receive gas therefrom, wherein said duct section comprises a tube of substantially constant cross-sectional area;

closure means for preventing the flow of gas from said driver chamber to said duct section until said closure means is opened; and

a dose of particles positioned within the device in the region of said closure means;

said device being so constructed and arranged that upon opening of said closure means, a primary shock wave is produced to travel along said duct section in a downstream direction and a substantially quasi-steady gas flow that is substantially free of shockwaves is established in said duct section upstream of said primary shock wave, said dose of particles being substantially wholly entrained

in said substantially shockwave-free quasi-steady flow for the duration of time that said particles are in said duct section so that said particles are accelerated and expelled from the device.

21. (Original) A needleless injection device according to claim 20, wherein the device is arranged so that said primary shock wave initiates a transient starting process upon reaching the downstream end of the duct section.

22. (Previously Presented) A needleless injection device according to claim 20, wherein said closure means is positioned at the downstream extent of said driver chamber.

23. (Previously Presented) A needleless injection device according to claim 20, wherein said driver chamber is pre-charged with pressurised gas.

24. (Previously Presented) A needleless injection device according to claim 20, further comprising a source of gaseous fluid, said driver chamber being fluidly connected to said source and arranged to be provided with said charge of pressurized gas by said source upon opening of a valve therebetween.

25. (Previously Presented) A needleless injection device according to claim 24, wherein said valve comprises a bleed hole of a size small enough substantially to de-couple said driver chamber from said source of gaseous fluid upon opening of said closure means.

26. (Canceled)

27. (Previously Presented) A needleless injection device according to claim 20, in which said particles are positioned upstream of said closure means.

28. (Previously Presented) A needleless injection device according to claim 20, wherein said duct section includes substantially no convergent portion therein downstream of said closure means.

29. (Previously Presented) A needleless injection device according to claim 20, further comprising a divergent nozzle portion positioned downstream of said duct section.

30. (Previously Presented) A needleless injection device according to claim 29, wherein said divergent nozzle portion has an inlet cross-sectional area and an exit cross-sectional area, said areas being chosen in accordance with the total driver chamber pressure at which said device is arranged to operate so that, in use, the gas flow in said divergent portion is substantially correctly expanded when said particles pass through said divergent portion.

31. (Previously Presented) A needleless injection device according to claim 29, wherein said divergent nozzle portion has an internal contour such that substantially no oblique shock waves are formed in said substantially quasi-steady flow.

32. (Previously Presented) A needleless injection device according to claim 29, wherein said divergent nozzle portion is contoured such as to cause any expansion downstream of the duct section to provide a generally radially uniform particle distribution at the exit of the divergent portion and a generally radially uniform particle velocity distribution, with a substantially parallel velocity of particles and gas exiting the device.

33. (Previously Presented) A needleless injection device according to claim 29, further comprising a spacer positioned at the downstream end of the device, the spacer being constructed so as to space a target plane downstream of the divergent nozzle portion exit with a clearance sufficient to allow:

a substantially normal shock wave to be positioned downstream of the exit of said divergent nozzle portion; so that said normal shock interacts, in use, with the gas and particle jet from said device to provide a substantially controlled and uniform gas stagnation region which decelerates the particles to a generally uniform velocity as they impact the target plane.

34. (Previously Presented) A needleless injection device according to claim 20, wherein said driver chamber comprises a substantially constant area tube.

35. (Canceled)

36. (Previously Presented) A needleless injection device according to claim 20, wherein said closure means comprises a rupturable membrane arranged to open by rupturing.

37. (Original) A needleless injection device according to claim 36, wherein said rupturable membrane is arranged to rupture in a controlled way due to an indentation on, or scoring of, the membrane surface.

38.-54. (Canceled)

55. (Previously Presented) A method of needleless injection involving the injection of particles into bodily tissue, the method comprising accelerating the particles in a needleless injection device using the method of particle acceleration claimed in claim 1.

56.-63. (Canceled)